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GULL LAKE -- WATER LEVEL STABILIZATION

This brief has been prepared by the Red Deer Regional Planning Commission with the co-operation of the Battle River Regional Planning Commission. Professor A. H. Laycock of the University of Alberta has acted as technical consultant.

RED DEER REGIONAL PLANNING COMMISSION

City of Red Deer

Town of Innisfail
Town of Rocky Mountain House
Town of Olds
Town of Sundre
Town of Stettler
Town of Lacombe
Town of Didsbury
Town of Carstairs

Village of Bowden
Village of Blackfalds
Village of Cremona

County of Red Deer #23
County of Lacombe #14
County of Stettler #6
County of Mountain View #17

Improvement District #65

Chairman F. D. Moore
Director R. R. Cundy, M.T.P.I.C.
Project Planner T. M. Cox, A.M.T.P.I.

The Summer Village of Gull Lake has also supported this work although it is not a member of the Commission.

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RED DEER REGIONAL PLANNING COMMISSION

REQUEST FOR ASSISTANCE UNDER PART VIII AGRICULTURE AND RURAL DEVELOPMENT ACT CONCERNING SOIL AND WATER CONSERVATION

1. Name of Project

Gull Lake — Water Level Stabilization

2. Objectives and Purpose

To stabilize water levels in Gull Lake by watershed management in the Gull Lake and Upper Lloyd Creek Basin involving improved land use and productivity by means of drainage, phreatophyte control and diversion.

a. provision of drainage and brush clearance in the Upper Lloyd Creek and Gull Lake Basins.

b. diversion of part of the flow of Lloyd Creek into Gull Lake by either pumping or gravity flow.

c. development of community pasture and other grazing lands.

d. ditching to extend the tributary basin of the Lake.

e. the use of grassed swales and sand filtration of inflow and other means of limiting erosion and maintaining and improving the quality of water entering Gull Lake.

f. preservation and placement of woodland on non-phraetic sites to increase the utility (for wildlife, recreation and agriculture) of the tree cover.

g. stabilize pothole ponds for migratory water fowl and stock watering where costs of drainage to the Lake are high and where such drainage is not necessary.

h. integrate road and field drainage systems.

i. drainage for beach improvement.

j. other measures of water yield, regime and quality improvement, erosion and flood limitation and related land management measures that may contribute to improved domestic, agricultural, recreational, wildlife and other water use.

k. the opportunity for research and training of personnel in various aspects of watershed management.

Sufficient initial investigation has been carried out both by the Water Resources Branch of the Alberta Department of Agriculture (1) and by Professor A. H. Laycock of the University of Alberta (2) acting as consultant to the Red Deer Regional Planning Commission to indicate both the causes of decline and the most promising methods of remedying the situation. The project is seen as a complex multi-use exercise in watershed and resource management with a wide range of benefits to the local community as well as to the visiting public.

(1) "Gull Lake Level Stabilization" February 1968

(2) "Water Balance of the Gull Lake Basin - A System Analysis for the period 1921 - 1968" July, 1968

3. Benefits

Gull Lake is one of the Province's prime recreational resources. More than half a million people annually use Aspen Beach Provincial Park and probably an equal number use the many other beaches along its shore line. In addition almost 500 private cottages have been built in resort subdivisions and church camp grounds established. Furthermore the trade of surrounding towns particularly Bentley benefit considerably from the tourist trade. Beach and water conditions are particularly suitable for young families and the Lake has a high potential for safe family swimming and boating. The continued decline in Lake levels is making this major resource progressively less attractive and putting in question its future as a recreation outlet for this Province.

Decline will continue unless thereis a substantial number of wet years and there is little reason to suspect such a series in the near future. Average to below average years similar to those of the past 47 years would result in continued water level declines and there is no low level at which a balance might be attained. Recent decline have resulted in the extension of marshy beach areas with a high water table on which phraetophytes thrive. Significant portions of the ground water inflow is intercepted and as this area extends, the amount available to the remaining Lake Area may be reduced sufficiently that no stabilization level can be obtained. Additionally decline recently has been too rapid to allow wave action to create a sand beach and thus a general deterioration of shore line quality is taking place. To maintain Gull Lake as a major recreational resource, beach and water quality control, stable water levels and better land utilization are all required.

Basically benefits from the project fall into two distinct groupings. Firstly there are the agricultural benefits which would result from improved land use and drainage in the area to the north of the Lake, and secondly there are the benefits resulting from the maintenance of and the increased potential for recreational development of the Lake itself. To these can be added a miscellaneous group of derived side benefits.

a. Agricultural benefits: Plan 1 indicates the soil capability of the area. A very considerable proportion falls in the categories 0 to 5 indicating low potentiality under existing conditions. This is substantiated by assesment records which give land values as ranging from $4.64 an acre to $19.81 an acre with a median value of $7.13 an acre. These values are on a 1964 base. Certain tangible benefits will result to farmers and farm practise in the area.

1. extended areas available for crop use resulting from field drainage of minor depressions which due to seasonal flooding, impede cultivation.
2. extended areas for pasture development in former slough or high water table areas giving higher productivity through production of more palatable and nutritious forage. * See Note 1; Page 8
3. extended areas for pasture development in wooded areas (phreatophytic woodland).
4. greater land values.
5. greater ease in the use of machinery.
6. increased farm income.
7. more effective weed control.
8. increased tax base to the County.

"The drainage and bush clearance involves two main approaches;

a. aquiring land and converting it to community pasture

b. maintaining present ownership with aquisition of such as easements for capital construction and other purposes

In the first case aquisition costs will be substantial, although a goodly portion of the land is presently uncultivated. The advantage would be that the drainage control could be more effectively achieved. In the second case the cost of aquisition is kept to a minimum. The problem would be that of ensuring that conflicts arising from the dissimilar arms of the farmer as against the Gull Lake programme do not thwart the purposes of the drainage programme. On the other hand because the land drained is released to the farmer for increased agricultural use, this fact can be placed before the farmers as one of the ways in which he will receive benefits."(3) Such benefits from increases in usable land due to land reclamation would have to be balanced against any losses which might result from inundation should it be found desirable to actually raise the water levels.

b. Recreational Benefits; Recreational benefits cover a number of differing considerations. Firstly there are the direct benefits to the economy of the area arising from retail trade, accommodation provision, commercial recreation facilities and the consequent effect on real income and employment in the area arising from them. Gull Lake is at present without the large scale commercialization that for example can be found at the southern end of Sylvan Lake. The actual contribution of the visitors, both itinerant and summer residents is not ascertainable without a special survey, but studies carried out in the Lake area of Wisconsin indicated a contribution in that area varying from 14% to 26% of total retail sales from outlets within the three counties surveyed. The highest percentages of expenditure occured in the automotive, general merchandise and eating and drinking categories. It is perhaps significant though that in terms of direct contribution to the economy of the area, the lowest contribution (less than 2%) was made by campers and the largest made by cottage owners and renters. It is probable that a not dissimilar pattern exists at Gull Lake with more than 400 privately owned cottages clustered around its shores.

The effects of a fall off in the attraction of the Lake would be serious, for not only would we be faced with an actual decline in trade which is unlikely to be made up for by the natural growth of the resident population, but it would deprive certain small settlements such as Bentley of a source of real growth. The Wisconsin Study indicates that for every $15,000 increment of real sales a further job opportunity equivalent to one man year becomes available. It should be noted here that the summer resident population of the area (excluding campers and day visitors) amounts to more than 1500 persons, twice the normal resident population.

Justification for the project also exists in relation to the present level of investment based on the Lake as a recreational resource. This investment comprises a number of items;

1. Aspen Beach Provincial Park
2. more than 400 summer cottages - assessed value 325,263 dollars
3. three summer camps
4. three municipal camp sites

The Aspen Beach Park is in itself an indication of the popularity of Gull Lake and the value put on it by the general public. It is probably the most intensively used of all Provincial Parks with some 516,620 persons using its 232 acres annually. A substantial part of this 232 acres has only recently been aquired and attendance figures have been held at the half million mark for several years as a result of present park facilities being used to capacity. During the peak of the season the Aspen Beach Park will deal with between 2000 and 3000 vehicles a day, or will accommodate between 8000 and 12,000 persons a day. This surely is a measure of the accessibility and popularity of this Lake resource. The only Provincial Parks with attendance figures anywhere near this level are Cypress Hills with almost 50,000 acres and Wabuman Park west of Edmonton with 692 acres.

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(3) "Proposed Gull Lake Stabilization Report"
Battle River Regional Planning Commission -- October 1968

Details of private investment in Lakeside resort subdivision is also worth consideration. The bulk of such investment lies at the southern end of the lake where beach conditions are at their best and the following table highlights the salient facts on each area.

SUBDIVISION	NUMBER OF LOTS		ASSESSMENT	
	OCCUPIED	VACANT	LAND	BUILDINGS
Gull Lake Village	228	24	$ 114,311	$ 150,083
Silver Beach	6	4	1,250	4,250
Lake View	0	26	1,120	NIL
Gull Lake (Plan 7364 KS)	14	2	3,200	15,120
Gull Lake (Plan 3737 KS)	33	3	9,380	41,780
Brighton Beach	41	21	5,650	13,970
Brownlows Landing	33	33	5,880	27,300
Birch Bay	27	91	21,200	35,090
McLaurin Beach	35	47	8,930	37,670
New Saratoga	7	11	2,290	7,820
Wilson Beach	10	20	5,120	7,510
TOTAL	434	282	$ 172,451	$ 340,693

This investment will become less and less productive if beach and environmental conditions round Gull Lake continue to decline.

Added to these substantial considerations must be the value of the resource to the individual visitor. In economic terms the worth of a resource is what the user is prepared to pay for the type of recreational opportunity offered. For example if we assume that the average distance travelled by Park users is 130 miles (to the Park and the return home) and that the average expenditure per person is three cents a mile (Transportation, food, entertainment, equipment allowance etc.) the average expenditure to utilize the Park would be over $2,000,000 annually. To this might be added the much greater per capita user expenditure for cottagers as well as camp users and other visitors. The worth of the resource measured by this means probably exceeds $5,000,000 annually. If the Lake deteriorates and present users are forced to find alternate areas to fulfill their needs, what additional costs are they going to have to bear and what costs are likely to have to be met by public sources to accommodate their needs elsewhere. These are essentially questions to be faced in the cost-benefit study, but is believed firmly that the progressive wastage of this resource cannot be afforded by the public interest represented by all levels of government.

It is hardly necessary here to labour the point of rapidly increasing recreational demand. As diagram 5 indicates, Gull Lake has extensive areas of Class Three shoreline (as defined by the Canada Land Inventory - Recreational Capability Index) which is particularly suitable for family bathing and boating. Additionally much of the shoreline is suitable for cottage development and the northern area has some fishing potential. The following table compares Gull and Sylvan Lakes in respect of recreational potential and shows the particular significance and importance of Gull Lake for the types of recreation already mentioned.

	GULL LAKE shoreline miles	SYLVAN LAKE shoreline miles
Class 1	NIL	NIL
Class 2	2.8 miles	3.0 Miles
Class 3	9.7 miles	5.1 miles
Class 4	18.1 miles	15.7 miles
Class 5	8.0 miles	2.8 miles
TOTAL	38.6 miles	26.6 miles

It should also be pointed out that the classification also indicates that Sylvan Lake's shoreline has a much lower potential for bathing than Gull Lake's and its major potential, with the exception of the extreme southerly end is for cottage development. Moreover much of the lower Class shoreline is in that category because of the marshy ground and scrub growth. It should be possible through drainage, water level control and some clearance to significantly improve beach areas and upgrade them. In short Gull Lake possesses the most extensive areas of reasonably good beach for family bathing and boating available in Central Alberta, but this potential is slowly dropping through deteriorating beach conditions resulting from a decline in the Lake water levels. It is worth noting here that the Outdoor Recreation Resources Review Commission in the United States in its report on prospective demand for outdoor recreation projected increases of more than 300% by the year 2000 for the very activities for which Gull Lake is most suited. These were among the highest increases expected in any of the recreation categories considered and of course related to the expected growth in the United State's population. In Alberta the growth rate of both population and recreational demand can be expected to be very much higher.

The rapidly expanding population centres of Edmonton and Calgary are placing increasing demands on Central Alberta's recreational facilities as is the steady growth of the region's own population. Gull Lake is one of the most accessible family resort areas and is well connected to the Province's north-south road spine (Highway #2) by Highway #53 in the north, and Highway #12 in the south. Both the Red Deer and Battle River Regional Planning Commissions see the development of the Lake as an essential part of their regional planning strategy.

The choice of Gull Lake as a target for conservation and development rests also on strong climatic grounds. Evaporation exceeds precipitation but the deficit is met approximately by inflow from the drainage basin. Stabilization can be attained with a comparatively small diversion. In this sense Gull Lake is unlike lakes in the areas to the south and east where much larger diversions would be needed for Lake stabilization because the deficit between lower precipitation and higher evaporation is much greater, whereas to the north and west actual surpluses often exist. Thus, Gull Lake although not unique in a climatic sense, is representative of a narrow marginal climatic zone. The problem of Lake selection for resource improvement is therefore a restricted one and the benefits to be obtained per unit cost are probably greater for Gull Lake than for any other Lake in Alberta.

c. Other benefits; A number of miscellaneous benefits of varying degrees of importance can also be listed.

1. to the people — higher incomes, and increased land values
2. to the counties — higher tax revenues and improved drainage and erosion control
3. to the economy -- greater and more dependable production; greater recreational expenditure in the province
4. to the province university and country -- in improved and applied research in watershed management
a model for development elsewhere

d. Conclusion; It is our concern that through resource and watershed management, the optimum value should be obtained from all resources within the area considered for action in this scheme, and for this reason we strongly feel that the possibilities for improved human opportunity through the wise and timely conservation and enhancement of our natural heritage should not be ignored. The raising of the water levels at Gull Lake should not be seen as simply a single object with a single directional force to achieve it, but as the major objective in a scheme bearing multiple benefits. The possibilities of such a scheme should be thoroughly explored and exploited for the greater benefit of all.

4. Project Description

Part I Investigation

a. Water Balance

The existing study should be refined and expanded taking into account other stations in addition to Lacombe as well as Lacombe's records prior to 1921. The data for Springdale should be processed so that a better impression of the Lloyd Creek supply variations might be obtained. Equally a close investigation of land use patterns in the Lloyd Creek Basin should be undertaken.

b. Local Drainage Patterns

The drainage patterns in the Lloyd Creek area and to the north of the Lake should be carefully studied. Drainage development costs for specific sloughs should be investigated and the benefits for drainage both in terms of through flow and to land use in the area should be evaluated.

c. Stream Diversion

The nature and costs of alternative diversion schemes should be studied based on a short list obtained from existing studies by the Water Resources Branch and Professor Laycock. The flow patterns yielded in relation to different degrees of capital expenditure should be investigated. Cost variations might also be studied in relation to alternate land use patterns and possible improvements to local drainage.

d. Community Pasture Development

The needs and prospects for community pasture development to the north of the Lake should be investigated.

e. Biotic Control

The vegetation pattern in the Lloyd Creek and Upper Gull Lake Basin should be closely investigated to identify phraetic sites and formulate plans for bush clearance.

f. Beach Conditions

The extent, nature, water levels and vegetation cover of the beach area should be investigated to ascertain the level of water loss from phreatophytes, the nature extent and cost of drainage and bush clearance.

g. Stabilization Levels

The most appropriate levels for stabilization should be determined taking into account many factors including local opinions and desires. The position with and without diversion into the basin should be studied, the level of acceptable fluctuations determined, overflow possibilities and costs investigated.

h. Cost-Benefit Analysis

This is seen as an exceedingly important aspect of the investigation. The relative costs and benefits of various alternates should be considered and from these an optimum solution derived. The Agricultural benefits will be relatively precise, the recreation ones less so. However, because recreation fills some profoundly felt need and has highly personalized values this does not mean that its value cannot be measured in a meaningful way. All programmes having social values must be decided upon within the limitations of finance and other factors. We would however maintain that the only value of relevance for an individual decision is the value of the contemplated addition or increment of recreational development that is achieved based on the desirability of the specific opportunity under consideration. In this case it would also involve the decrease in value of existing recreational development which would result from a failure to take action.

Part II Scheme Preparation

This would involve the drawing up of detail plans and costs, phasing and determination of responsibilities for action, and the concluding of agreements.

Part III Scheme Implementation

This would include the letting of tenders, construction supervision etc..

5. Organizations

The primary responsibility for the project would lie with the Water Resources Branch of the Provincial Department of Agriculture. Certain aspects will call for co-operation with other agencies for example Federal ARDA on Community Pasture, Economics on Cost Benefit, the Planning Commissions on development proposals and planning strategies.

In view of the high degree of local involvement it is hoped that this may be maintained and strengthened by the forming of a consultative committee consisting of the following:

County of Ponoka representative
County of Lacombe representative
Village of Gull Lake representative
Chamber of Trade representative
Battle River Planning Commission representative
Red Deer Planning Commission representative
Provincial Parks Department representative

This would allow continuing local participation involvement and understanding of the project and is felt particularly relevant where the agency requesting assistance is not the agency carrying out the project. The Committee should be concerned with the need for local co-operation during the project and consideration of the detailed work for the investigation programme and its results in relation to the needs of their areas.

6. Costs and Revenue

At this stage costs are not known but it is anticipated that they will be in the region of $500,000. Under Part VIII arrangements 100% of the investigation costs are born by senior governments on a 50%;50% basis but project costs require a 25% local contribution. The cost sharing arrangement will need to be worked out carefully bearing in mind that this is not a local drainage project but resources conservation of Provincial importance. It is suggested therefore that a full 25% contribution on the neighbouring authorities is inequitable and a scheme something on the lines of the following example should be negotiated.

Assumed Project Cost $500,000

Federal Government	37½%		$187,500
Provincial Government	37½%		187,500
Local Contribution	25 %		
Additional Provincial Contributions		5%	25,000
Park Levy		10%	50,000
Local Authorities		10%	50,000
TOTAL			$500,000

Breakdown of Local Contributions

Park Levy 10 cents ahead or 25 cents a vehicle for one year	$ 50,000
County of Lacombe	23,250
Village of Gull Lake	19,500
County of Ponoka	7,250
Additional Provincial Contribution	25,000
TOTAL	$125,000

In the Village of Gull Lake for example this amounts to $85.53 per cottage or 73.75 mills. It may also be necessary to spread the local contribution over a number of years to avoid hardship. This will be particularly feasible as the project may take several years to execute. This financial arrangement does not indicate that the municipalities involved are willing to contribute these specific amounts, but simply is presented as a possible basis for negotiation. This will not be possible until precise costs are known. The relative municipal contributions are based on the assessed value of land and improvements adjacent to the Lake and in the case of the County of Ponoka within the drainage area.

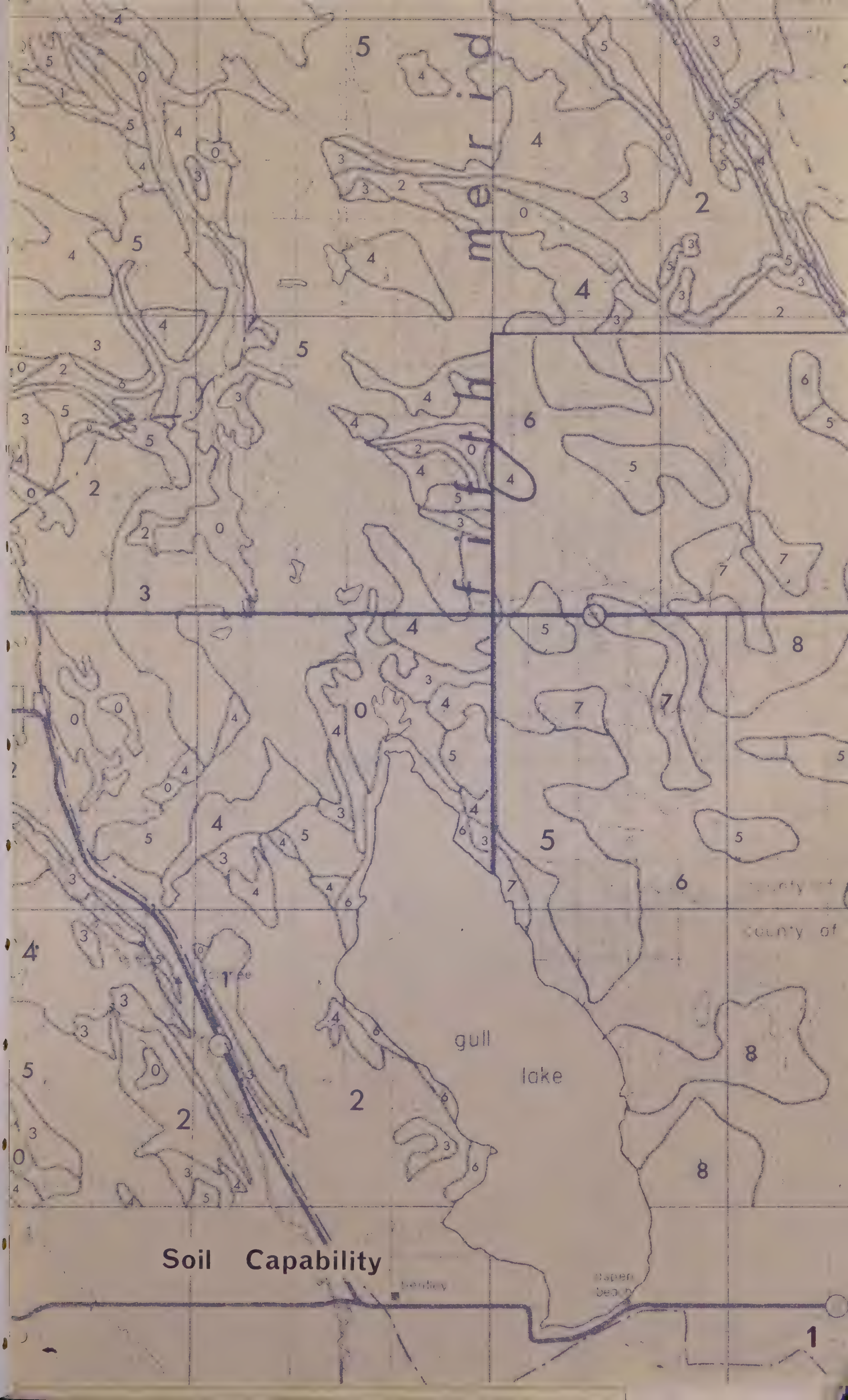
There will be no direct revenue from this project.

21 October 1968

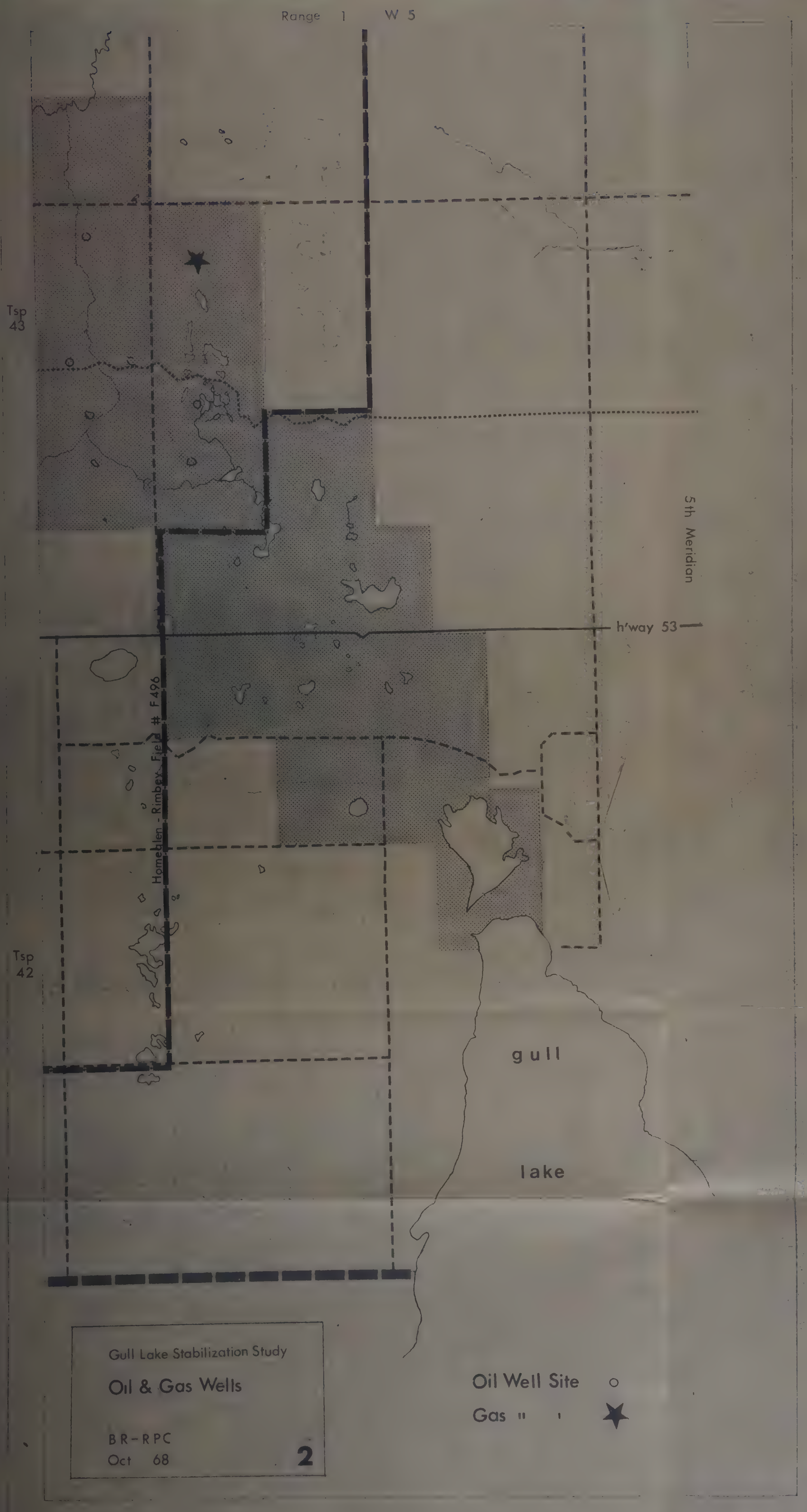
NOTE 1: The present carrying capacity of the area is roughly estimated to be 10 acres per head. Improvements through clearance and drainage could conservatively be estimated to double this capacity which within the area in question would result in production increases amounting to more than $250,000 over a ten year period.

ANNEXES

Plan 1	Soil Capability - part of the County of Ponoka
Plan 2	Oil and Gas Wells - part of the County of Ponoka
Plan 3	Recreational Capability - part of the County of Ponoka
Plan 4	General Location Plan showing drainage areas
Plan 5	Shoreland Capability - Gull Lake
Report 1	Summary and Recommendations from "Water Balance of the Gull Lake Basin" by Professor A. H. Laycock
Report 2	Proposed Gull Lake Stabilization Report by M. Barrow, Battle River Regional Planning Commission



Soil Capability



Gull Lake Stabilization Study

Oil & Gas Wells

BR-RPC
Oct 68

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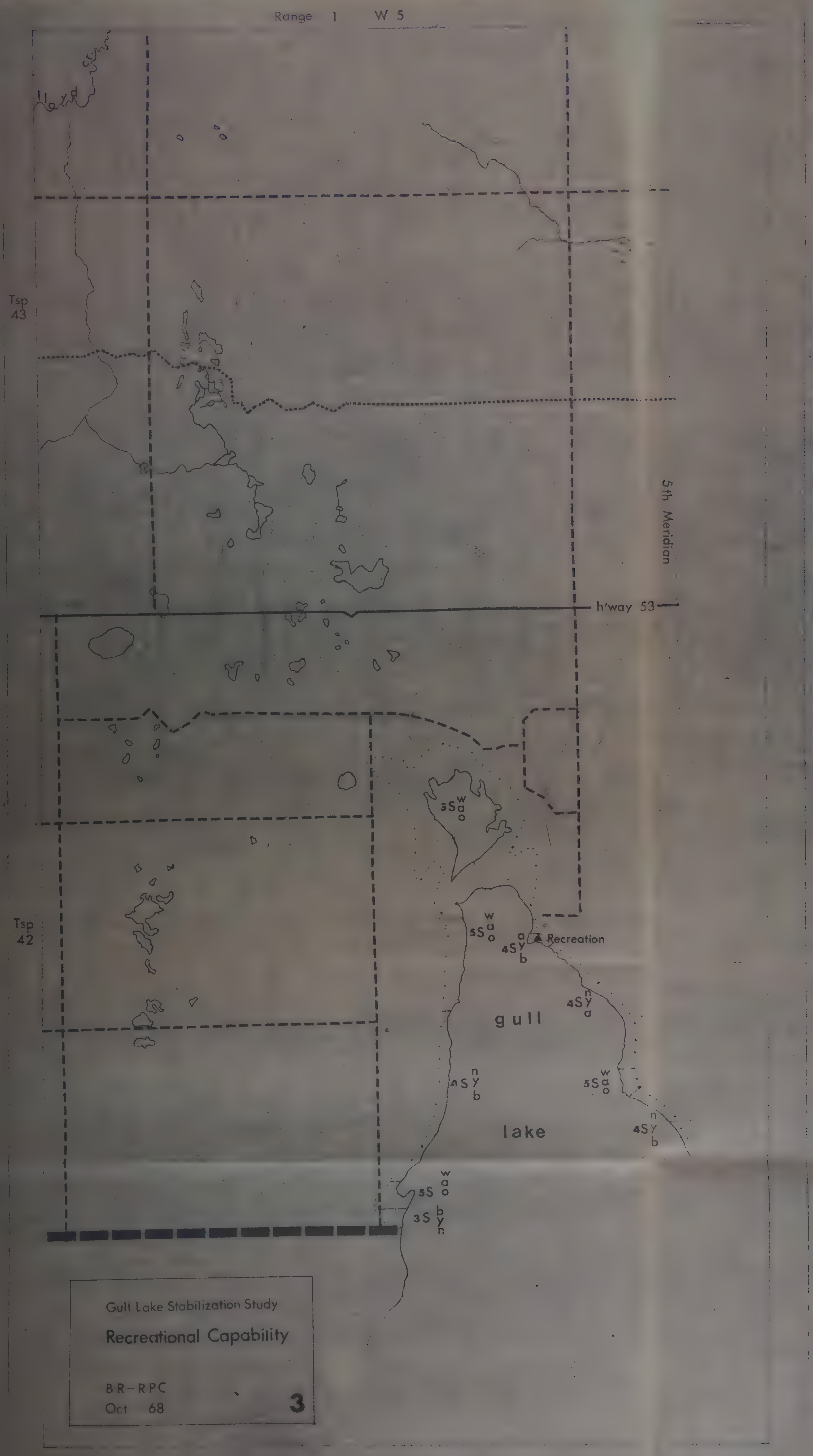

Gull Lake Stabilization Study

Recreational Capability

BR-RPC
Oct 68

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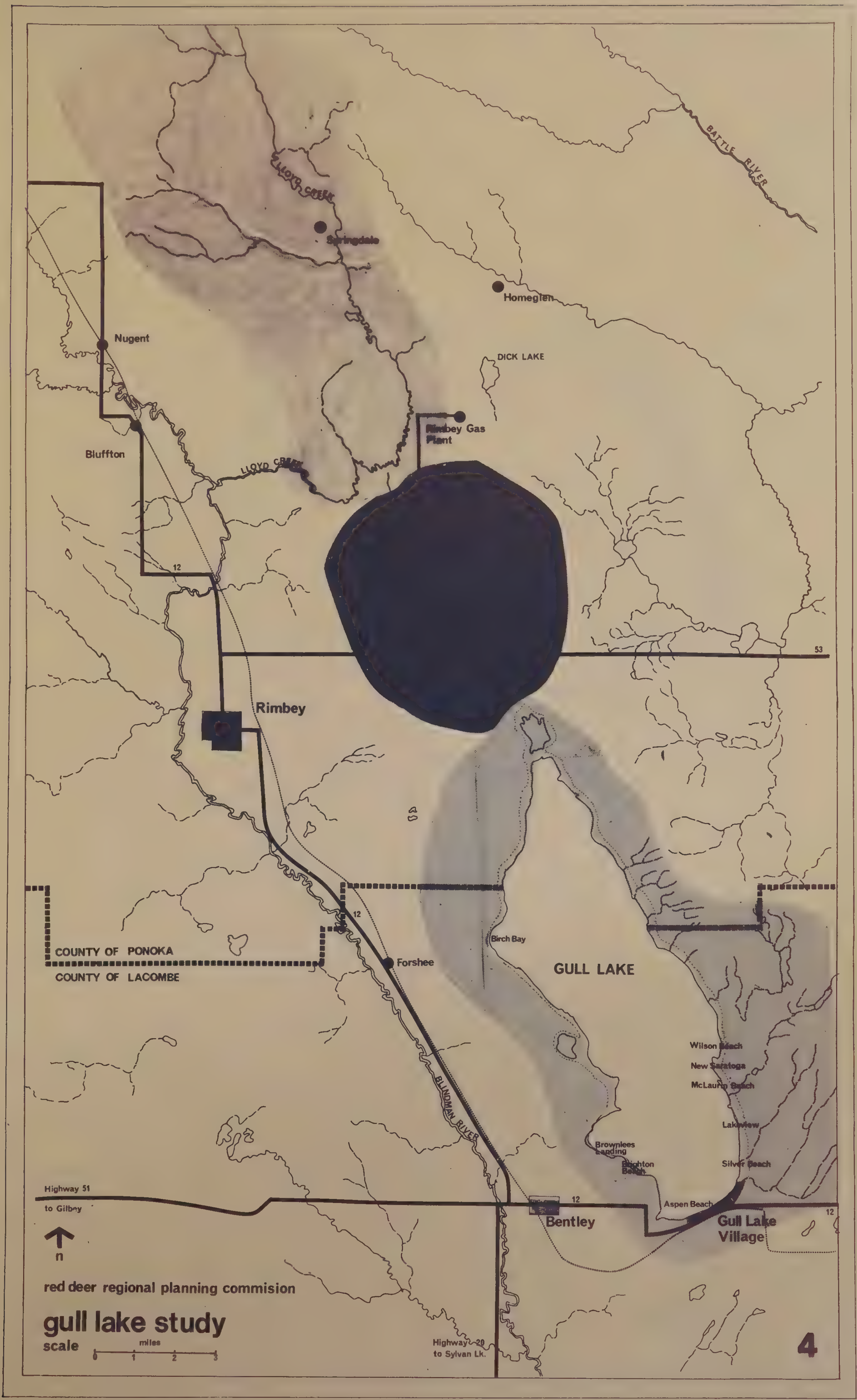
BATTLE RIVER
LLOYD CREEK
Springdale
Homeglen
Nugent
DICK LAKE
Rimbey Gas Plant
Bluffton
LLOYD CREEK
12
53
Rimbey
COUNTY OF PONOKA
COUNTY OF LACOMBE
12
Forshee
Birch Bay
GULL LAKE
Wilson Beach
New Saratoga
McLaurin Beach
Lakeview
BLINDMAN RIVER
Brownlees Landing
Brighton Beach
Silver Beach
Aspen Beach
Highway 51
to Gilbey
12
Bentley
Gull Lake Village
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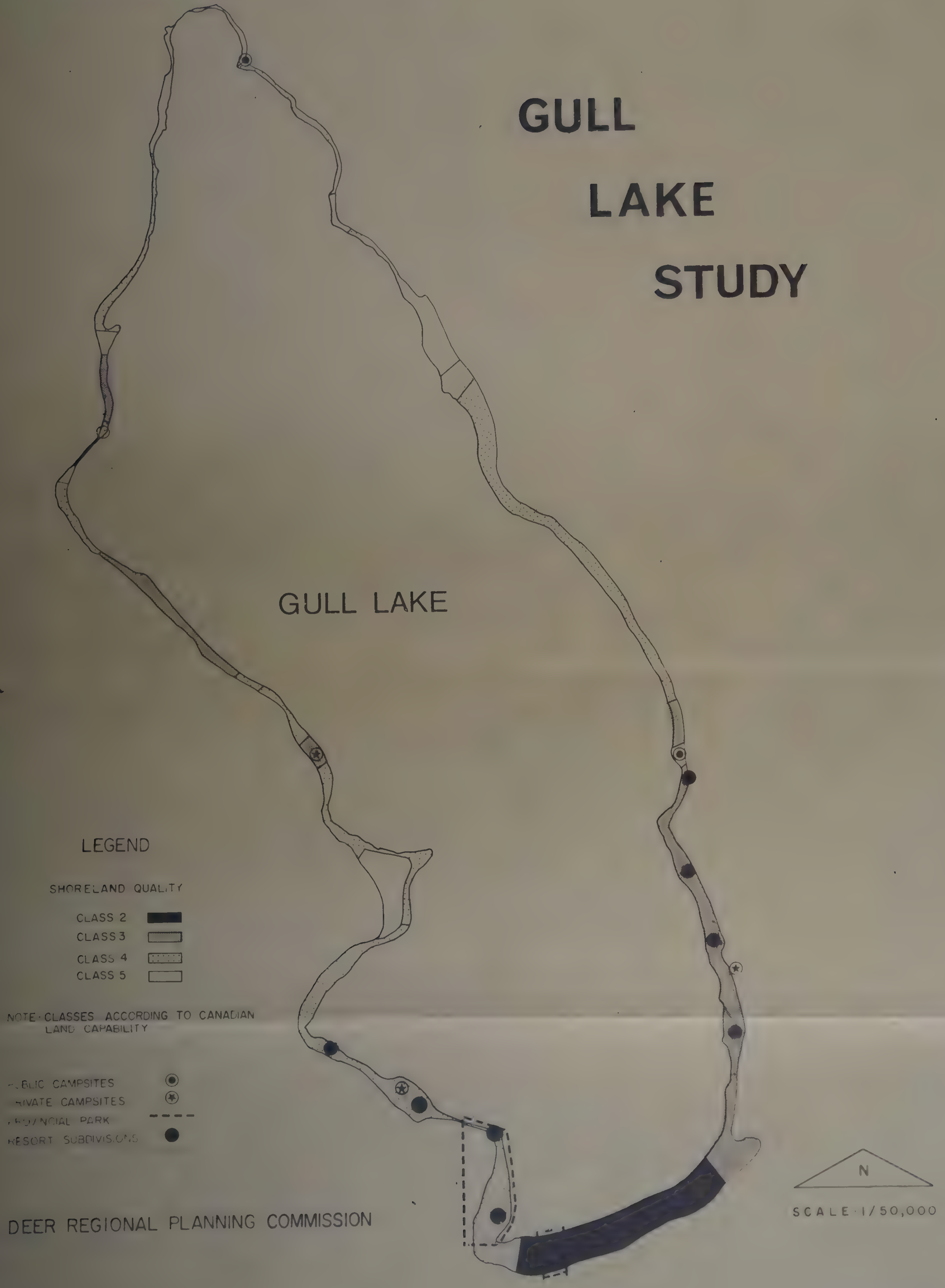
GULL LAKE STUDY



RED DEER REGIONAL PLANNING COMMISSION

THE WATER BALANCE OF THE GULL LAKE BASIN - SUMMARY AND RECOMMENDATIONS*

The Water Balance: In the period 1921-1967, the precipitation upon Gull Lake was approximately 32,531 acre feet per year (17.94 inches). In the same period, evaporation was 41,344 acre feet per year (22.80 inches). The net inflow (surfact and groundwater) into the lake from its surrounding drainage basin was approximately 3,796 acre feet. This was approximately 5,017 acre feet per year short of being enough to maintain a stable level in the lake and a decline of lake level of 11.4 feet has taken place in the period.

In 14 of the 47 years of the period 1921-1967, lake levels rose as a result of combinations of greater precipitation upon the lake and basin, smaller evaporation from the lake and smaller evapotranspiration from the basin. In 1957-1968, lake evaporation was exceeded by precipitation and inflow only in 1965 but the rise was small and the lake level declined by more than 6 feet in the 12 year period. The declines can be explained satisfactorily by reference to climatic or hydro-meteorologic factors and it might be suggested that water levels might recover naturally in a series of relatively wet, cool years comparable to those earlier in the century when overflow levels were experienced. We have no assurance that such wet, cool years will occur soon and we may just as well have more warm and dry years and lake levels may continue to decline.

Restoration and Stabilization: We can restore Gull Lake to desired levels and prevent major fluctuations in the future by several means, the most promising of which are diversion from Lloyd Creek and pumping from the Blindman River - both with some degree of watershed management. Watershed management alone could contribute to a more rapid recovery in average and wetter than average years but in a period comparable to that of 1921-1967 the more feasible management measures might have reduced the drop in water level by only one third - they would not have prevented declined. The proportion of the precipitation flowing into the land from the surrounding basin might have been increased from 5.7 per cent to at least 7.9 per cent with land clearing and slough drainage that would probably have been feasible for agriculture. Additionally inflow might have been obtained from more intensive drainage, closer cover control, particularly of phreatophytic growth, and more extreme measures such as paving surfaces, but costs might have been such that alternative means of obtaining extra water would probably have been cheaper. An exception if possible to the north and northwest of the lake where a large, almost wholly cleared and intensively used community pasture with a well developed drainage network could have had significantly greater water yields than the badly drained, largely wooded area now present. Water level fluctuations in Gull Lake would be smaller with management but they would still occur.

A diversion of Lloyd Creek into Gull Lake could bring lake levels back to desired elevations and provide some outflow - if we assume that precipitation and temperature conditions will be similar to those of the past 47 years. The diversion scheme outlined in the February 1968 report of the Water Resources Division has merit but less costly alternatives to it might be possible. The above scheme involves construction of large dams and the impoundment of a large reservoir which would provide virtually complete control of all of the flow of Lloyd Creek. Smaller dams, or a weir upstream from the proposed dam, and a much smaller reservoir might divert most of the flow of Lloyd Creek. With watershed management in both of Gull Lake and Lloyd Creek basins, this flow of approximately 8,000 to 11,000 acre feet per year would be more than adequate to restore and maintain Gull Lake levels. Restoration could be rapid in a series of wet years or slow in a series of dry years but the positive balance is large enough that supplemental supplies from other sources should not be needed.

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* Based upon "The Water Balance of the Gull Lake Basin" by Professor A. H. Laycock, a report submitted to the Red Deer Regional Planning Commission, July 1968, and "Gull Lake Level Stabilization", a report prepared by the Water Resources Division, Alberta Department of Agriculture, February 1968.

Pumping water from the Blindman River would involve a smaller initial cost but operating costs would be relatively high. With moderately intensive watershed management in the Gull Lake basin, and a series of average to wetter than average years, a pumping program could be less costly over a few decades than a diversion of Lloyd Creek. We cannot anticipate many wet years in the near future and the diversion might supply added benefits in through-flow, thus it is preferred.

Recommendations: It would appear that a diversion of Lloyd Creek in combination with a moderate degree of watershed management would best solve the problems of restoring and stabilizing Gull Lake levels. The costs of diversion can be reduced by providing less than full control of Lloyd Creek and most of the costs of watershed management might be borne by land improvement through clearing and drainage, particularly in the northern part of the basin where a community pasture might be established - possibly with ARDA support.

Preliminary investigations indicate that funds for diversion and watershed management are very limited this year but specific action programs might be investigated more closely and proposals for Alberta Department of Agriculture, ARDA and Red Deer Regional Planning Commission developments might be submitted so that work might be started when funds are available - possibly in 1969 and at least in 1970. The Water Resources Division should be asked to determine the costs of alternative diversion and drainage schemes and to include estimates in forthcoming budgets for the more promising of these measures. A proposal should be prepared for submission to the Alberta ARDA Committee by which a community pasture should be developed as a part of a watershed improvement program. The Red Deer Regional Planning Commission might be asked to promote and support local drainage and clearing programs, determine community pasture needs and costs, survey local opinions concerning desired water levels and conduct additional studies of water balance patterns in the Gull Lake and Lloyd Creek Basins. Finally, an action program should be initiated by arranging for the necessary requests and proposals to be drawn up and by providing financial support for the preliminary studies needed to make them specific, valid and effective.

A. H. Laycock
July, 1968.

BATTLE RIVER REGIONAL PLANNING COMMISSION

PROPOSED GULL LAKE STABILIZATION REPORT

Resume of Developments

Concern expressed by government agencies and private individuals regarding the marked reduction in the water level of Gull Lake has led to the need for taking stock of the future of this lake. Among the important aspects of this anxiety is the detrimental effects of the receding water level on the lake as a recreational resource and the implications for cottage owners affected.

Because of these factors, initial steps have been taken by the Provincial Water Resources Department and the Red Deer Regional Planning Commission to investigate wheter or not practical and effective methods are available to raise and stabilize the lake level.

Preliminary studies, aimed at establishing the lake as a major recreational resource and providing information on the technical problems of diverting water from nearby sources to the lake, have made three main proposals:

1. Divert water from Lloyd Creek and pumping it into Gull Lake;
2. Supplement this diverted source by conserving the ground and surface water which maintains the sloughs and ponds north of Gull Lake;
3. Convert the drainage area in 2 to a community reserve to meet the needs of farmers in the area.

Since the above proposals have several implications for the County of Ponoka, the need for inter-municipal co-operation becomes imperative. The inter-regional nature of the proposals is the basis for this Report.

Aims of This Report

The aims of this report are fourfold. Firstly, to present basic data relating to physical conditions, present land uses and land values; secondly, to indicate the capability ratings of the land at the north end of the lake; thirdly, to itemize, on a tentative basis only, some of the benefits and costs that will be generated; fourthly, to point out the relationship of this project to the West of the Fifth Report. In each case, the primary concern is with the County of Ponoka.

Physical Characteristics:

1. Soil

   The broad soil zone of the area to be dealt with has been classified as Grey Wooded Soil by the Alberta Soil Survey (published by the Department of Lands and Forests).

2. Topography

   Land in the area north of Gull Lake is rough and irregular. A number of sloughs and groundwater-charged depressions alternate with several outcroppings of hills and knolls. However, many acres of rolling productive farmland occur.

   Map 3 depicts the topographical characteristics by means of contours at 25 feet intervals. For more detailed study, much narrower intervals would of course be necessary.

3. Vegetation

The kind of vegetation present, and the effect the tree cover has by utilizing water from the sloughs and ponds, have been outlined by Dr. Laycock in his study, The Water Balance of the Gull Lake Basin, and will not be repeated here.

Land Use

For the purposes in hand, the parcels that will be considered are in Sections 14, 15, 22, 23, 26, 27, 28, 32, 33, and 34 in Township, 42, Range 1, West of the Fifth Meridian, and in Sections 3, 4, 5, 7, 8, 9, 17, 18, 19, 20 and 30, in Township 43, Range 1, West of the Fifth Meridian. This comprises an area of 8,319.39 acres stretching from Lloyd Creek (at its closest point to Gull Lake) to the north end of Gull Lake.

Apart from the extensive tree cover, which includes the water-loving phraetophytes, the main use of the land is for agriculture. Mixed farming with emphasis on hay and pasture for livestock is predominant, with some grain.

The distribution of farms by size is given in Table 1:

Table 1: Distribution of Farms by Size

	Number of Farms in Range	Per Cent of Total
Under 80 acres	9	20.5
80 - 160.99 acres	14	31.8
161 - 320.99 acres	12	27.3
321 - 480.99 acres	7	15.9
481 - 640.99 acres	2	4.5
	44	100.0

Though a number of the farm holdings in the area might appear to be small in many cases they represent only part of the total holdings of the farmer, since many own additional acreage close by.

Median farm size has been estimated at 160.65 acres. Further details on farm holdings and distribution appear in the Appendix.

Land Values

Assessed land values are presented in the Appendix, which also gives data on assessed values of land per acre for each parcel, total number of acres farmed and cultivated and the addresses of farmers.

Per acre assessed values range from $4.64 to $19.81, with a median value of $7.13.

It should be noted that the assessment values were assigned in 1964, according to County records. The data on cultivated acreage were also calculated for 1964. Thus some upward adjustments may be necessary.

Land Tenure

Information as to land tenure can also be obtained from the Appendix. Table 2 gives land tenure in more concise form.

	Acres Owned	Per Cent of Total
Private	7,414.99	89.12
Crown	534.24	6.42
Marathon Realty Ltd. (C.P.R.)	336.20	4.04
County of Ponoka (Recreation)	33.96	0.41
	8,319.39	99.99

From the above is excluded an estimated 325 acres under water for most of the year in sloughs and small lakes.

Oil and Gas

The area is partially covered by the Homeglen-Rimbey Field #F.496. The oil and gas wells are indicated in Map 2.

The particular relationship of oil and gas wells to the project would have to be worked out as part of a future study.

Land Capability:(1)

1. Agriculture

The land capability for agriculture (Map 1) shows that although a large portion is given a classification of 0, substantial acreages are suitable for hay and pasture. Aerial photographs of the area suggest the general agricultural use of the land where the soil permits, sometimes even in areas given a 0 rating, particularly around the north end of the lake.

2. Recreation

Map 3 provides data on the recreational use potential of that part of the lake which lies in the County of Ponoka. The north end of the lake is considered to be good for fishing. The County of Ponoka has recreation grounds on the east shore.

3. Wildlife

The classification of 6 J/Z has been attached to the lake as an indication of wildlife potential. This suggests a low wildlife habitat usefulness under present conditions.

Benefits and Costs

Difficult as it may be, it will be necessary to determine whether benefits to be derived from the project will justify the costs involved. This implies estimates to show whether or not direct and indirect benefits will equal or surpass direct and indirect costs. Benefits and costs will be incurred related to:

a. Pumping Water from Lloyd Creek

The technical and engineering aspects of diverting Lloyd Creek is an area for which the Water Resources Branch is responsible. The various facets of the problem, including how and what farms will be affected, will have to take into account the costs and benefits to such farms as are affected. Without specific information as to what is proposed, little can be gained by considering the question here.

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(1) Unpublished data from the Canada Land Inventory Studies have been used in this section.

b. Drainage of Land North of Gull Lake

The proposal that the land north of Gull Lake be drained to assist in maintaining the lake level as a continuing programme has been related to the ability to manage the watershed and drainage area. It is perhaps for this reason that proposals on this aspect of the Gull Lake Development suggest utilizing the drainage basin area as a community pasture.

A drainage system as envisaged involves two main approaches:

(i) acquiring the land and converting it to a community pasture;

(ii) maintaining present ownership with acquisition of such areas as may be needed, such as easements for capital construction and other purposes.

In the first case, acquisition costs will be substantial, although a goodly portion of the land is presently uncultivated. The advantage would be that the drainage control could be more effectively achieved.

In the second case, the cost of acquisition is kept to a minimum. The problem would be that of ensuring that conflicts arising from dissimilar aims of the farmer as against the Gull Lake programme do not thwart the purposes of the drainage programme. On the other hand because the land drained is released to the farmer for increased agricultural uses, this fact can be placed before the farmers as one of the ways in which he will receive benefits. Such benefits from increases in usable land due to land reclamation has to be discounted by the amount of land lost to farmers in areas covered by water in raising the lake level. In the same way it should be recognized that overall gains in land reclaimed may be more apparent than real. The rough and hilly topography will limit the usefulness of a large part of the land where farm machinery cannot be operated without grading. Such land can of course be used as native pasture.

c. Development of the Recreational Potential

This will be the major objective of the development scheme. Particular attention would have to be paid to the justification of cost in terms of the benefits to be derived from such a scheme.

Some of the benefits and costs which it is thought will accrue are:

Benefits

1. Farmland

(a) Tangible:

- increased farmland due to drainage and land reclamation
- greater land values
- removal of undesirable tree cover and replacement with more suitable use of the land
- better use of machinery
- increased incomes and employment from farms and the project itself
- the ability to construct a better road system to give access to farms
- increased tax base for the County

(b) Intangible:

-knowledge farmer would have that his land is more useful and marketable.

2. Recreation

(a) Tangible:

- improvement of recreation sites
- improvement of the area for wildlife
- better use of recreation areas due to improvement

(b) Intangible:

- ability of the County of Ponoka to plan for better recreational use
- a better road system

Costs

1. Agriculture:

- cost of the drainage system project and its maintenance
- cost of removal of undesirable tree cover
- cost to farmers who improve their land
- administrative costs involved

2. Recreation:

- improvement in recreational sites
- administrative costs

Other costs can be itemized and should be considered in the actual cost-benefit analysis. One question to be answered will be the effect on fish and fishing at the north end of the lake.

Raising of the water level will cause some land now part of the lake valley to be inundated. The extent of such flooding is not determinable from the present 25 foot contour map. In any case, such flooding would mean that additional costs for land removed from production and payment to farmers affected should be deducted from future benefits.

An additional intangible but appreciable benefit would perhaps accrue from the development of procedures to implement watershed management programmes on privately owned lands. A pilot project for such a programme would provide an outline for future uses of such procedures throughout the Province.

Relation of the Project to the West of the Fifth Report

It was proposed in the West of the Fifth Report that recreational uses of the part of the lake in the County of Ponoka "should be developed along with or as part of the scheme of development for Gull/Lake as a whole" (page 42). It is felt that the proposed scheme would support that principle. Furthermore, the integrated approach implicit in the scheme is in basic agreement with the principles of comprehensive planning advocated in that report.

M. M. Barrow,
Planner

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